Revue suisse de Zoologie 111 (4): 953-978; décembre 2004

Five new species of the *Hypostomus cochliodon* group (Siluriformes: Loricariidae) from the middle and lower Amazon System

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Five new species of the *Hypostomus cochliodon* group (Siluriformes: Loricariidae) from the middle and lower Amazon System. - Five new species of *Hypostomus* from the *cochliodon* group are described from the middle and lower Amazonian Basin. Data for a population of *H. hemicochliodon* Armbruster, 2003 from Rio Branco (Roraima, Brazil) and comments on the identity of *Hypostomus cochliodon* Kner, 1854, and on the paraphyly of the group are given. A hypothesis that *Hypostomus soniae* sp. n. may have been separated from a Paraguayan species during the late Tertiary is advanced. A key for identification for the species of the *Hypostomus cochliodon* group from Amazon Basin is given.

Keywords: *Hypostomus* - *cochliodon* group - Amazon Basin - catfishes - new species - systematics.

INTRODUCTION

Hypostomus La Cépède, 1803 is one of the most species rich genera among the South American fishes, with 111 valid species and about one third more still undescribed (Weber, 2003; Armbruster, 2003). The species of the *cochliodon* group are reported from the Amazon, Orinoco, La Plata and Guianese river systems. With 11 recognized species, it comprises the species of the former genus *Cochliodon* Heckel, 1853 and other recently described species. Closely related to *Hypostomus*, *Cochliodon* was based on a single apomorphy, its spoon shaped (called cochleariform) teeth. Later on, Eigenmann (1922) described *Cheiridodus*, differing from *Cochliodon* by the presence of a small outer cusp on the teeth, that was later recognized as a junior synonym by Dahl (1971). Based on morphological characters and mitochondrial DNA analysis, *Cochliodon* was placed in the synonymy of *Hypostomus* and treated as a monophyletic group within this genus (Montoya-Burgos *et al.*, 2002; Weber & Montoya-Burgos, 2002). Armbruster (2003) revised the *cochliodon* group, extending the distribution areas and variations of morphological characters of most species, which have been poorly described in several cases, also identifying their different

Manuscript accepted 08.10.2004

populations among different basins. From the Amazon, Aroa, Atrato, Essequibo, La Plata, Magdalena, Orinoco, Sinu, Tocuyo, Tuy and Yaracuy river drainages, and Lake Maracaibo drainage, the *Hypostomus cochliodon* group can be distinguished from most other loricariids by the combination of highly angled jaws and usually less than 20 teeth per jaw ramus (Armbruster, 2003). Cochleariform teeth, with or without apparent outer cusp, distinguishes this group of species from remaining *Hypostomus*.

In this paper, five new amazonian *Hypostomus* species of the *cochliodon* group are described and data for a population of *H. hemicochliodon* Armbruster, 2003 are given, expanding the known distribution area for this species. Comments on the redescription of *H. cochliodon* Kner, 1854 in Armbruster (2003) are made based on the Kner's original description and on the similarities between *Hypostomus soniae* sp. n. and *H. cochliodon* sensu Armbruster, 2003 (part) from Paraguay river basin, called here *Hypostomus* aff. *soniae*. A key is given for the fishes of the group recorded from the Amazon River System.

MATERIAL AND METHODS

Measurements were made with a digital calliper to the nearest 0.1 mm; counts and measurements follow Boeseman (1968); description of buccal papilla size and count of odontodes on opercle follow Armbruster (2003). Vertebrae were counted on X-ray images of holotypes, except for *Hypostomus hemicochliodon* which was based on specimen MZUSP 34626. Drawings were made using a profile projector Nikon V12 and Nikon SMZ-10 stereomicroscope with camera lucida; teeth drawings were made from replacement teeth of upper right jaw. Colour description was based on preserved specimens; for *H. ericae* a brief note of colour in living specimens is based on pictures of a specimen taken in the field. Material not explicitly mentioned is listed in the Appendix.

Institutional abbreviations follow Eschmeyer (1998); other abbreviations are: col. (collectors), ex. (exemplar[s]), MG (Michael Goulding), n (number of specimens examined), PSM (Projeto Serra da Mesa), SD (standard deviation), SL (standard length).

KEY TO THE SPECIES OF THE *HYPOSTOMUS COCHLIODON* GROUP FROM THE AMAZON BASIN

1 Absence of adipose fin . . . . . *H. levis* (Pearson, 1924). Upper Madeira River
- Presence of adipose fin 2
2 0 to 10 odontodes on opercle 3
- More than 10 odontodes on opercle 8
3 Body covered by close-set spots (Figs 2, 9, 10) 4
- Body covered by widely spaced spots (Figs 5, 7) 6
4 Presence of buccal papilla . . . . . *H. waiampi* sp. n. Cupixi River
- Absence of buccal papilla (see Armbruster, 2003:14) 5
5 0 to 10 odontodes on opercle; well developed keels on body . . . . . *H. oculeus* (Fowler, 1943). Upper Amazonas River

- 0 to 3 odontodes on opercle; keels on body absent or poorly developed . . . . . *H. pyrineusi* (Miranda Ribeiro, 1920). Upper Amazonas River
6 Absence of buccal papilla. *H. ericius* Armbruster, 2003. Upper Amazonas River
- Presence of buccal papilla 7
7 Adipose-fin spine strongly curved on adult specimens (Fig. 3B); caudal peduncle deeper (2.3 to 3.0 in caudal peduncle length); 31 vertebrae . . . . . *H. ericae* sp. n. Upper Tocantins River
- Adipose-fin spine not strongly curved (Fig. 3C); caudal peduncle shallower (1.8 to 2.3 in caudal peduncle length); 33 vertebrae . . . . . *H. paucipunctatus* sp. n. Itacaiúnas River
8 Body without spots, sometimes with longitudinal stripes (fig. 8); 25 to 27 scutes on lateral line; adipose-fin spine long (11.5 to 15.0 in SL) and curved (fig. 3D) . . . . . *H. soniae* sp. n. Tapajós River
- Body covered with spots; 28 to 30 scutes on lateral line; adipose-fin spine not so long (12.8 to 19.2 in SL) and curved 9
9 Small interorbital width (2.2 to 2.6 in head length) . . . . . *H. sculpodon* Armbruster, 2003. Upper Negro and Orinoco Rivers
- Large interorbital width (1.8 to 2.3 in head length) 10
10 Large eye orbits, higher than frontals (fig. 9); tip of occipital bone higher than first predorsal plate . . . . . *H. simios* sp. n. Cupixi River
- Eye orbits at the same level of frontal head profile; tip of occipital bone as high as first predorsal plate (Fig. 10) . *H. hemicochliodon* Armbruster, 2003 . . . . . Amazonas, Negro, Tapajós, Xingu and upper Orinoco Rivers

DESCRIPTIONS

Hypostomus waiampi sp. n. Figs 2, 3 & 4; Tables 1 & 4

Holotype: MZUSP 82269, 169.3 mm SL. Brazil: Amapá: bridge on the road to Serra do Navio, Cupixi river (station nb. MIG 84010006); January 1984; col. Michael Goulding.

Paratypes: MZUSP 82270, 8 ex., 139.9 – 193.9 mm SL; MHNG 2652.016, 1 ex., 172.5 mm SL. Same data as holotype.

Derivatio nominis. Waiampi is an amerindian ethnic group from northeastern Brazil, presently established in an Indian Reserve with the same name, western Cupixi River Basin. Noun in apposition.

Diagnosis

Hypostomus waiampi is distinguished from *H. soniae*, *H. sculpodon*, *H. simios* and *H. hemicochliodon* by the number of odontodes in the opercle (0 to 10 versus more than 10); it is distinguished from *H. ericius*, *H. ericae* and *H. paucipunctatus* by its colour pattern, with close-set spots covering its body (versus widely spaced spots; Figs 2, 5 & 7); from *H. oculeus* and *H. pyrineusi* by the presence of a buccal papilla (versus absence); from *H. levis* by the presence of an adipose fin (versus absence). Its low number of teeth (6 to 8) also distinguishes him from *H. levis*, *H. soniae*, *H. simios* and *H. sculpodon* (more than 10 teeth).

FIG. 1

Localities of examined specimens. Type localities are: circle: *Hypostomus waiampi* sp. n. and *H. simios* sp. n. (syntopic); star: *H. ericae* sp. n.; diamond: *H. paucipunctatus* sp. n.; square: *H. soniae* sp. n. Localities of populations of other fishes examined: triangle: *H. hemicochliodon* Armbruster, 2003; asterisk: *H. cochliodon* Kner, 1854 and *H.* aff. *soniae*.

MORPHOLOGY

Standard length of examined specimens 139.9 to 193.9 mm; morphometric and meristic respectively in Tables 1 & 4.

Head dorsally covered with dermal ossifications, except for small amorphous naked area on snout tip, as large as nostril. Profile slightly convex, with very light depression between eyes. Dorsal margin of orbit slightly elevated, weakly continuing in inconspicuous ridge on postemporal and following plates. A single plate bordering posterior margin of supraoccipital. Opercle supporting less than 10 odontodes. Outer face of upper lip covered with small odontodes, concentrated on middle and distal areas in smaller specimens. Barbells short. Few (6 to 8) large spoon-shaped teeth.

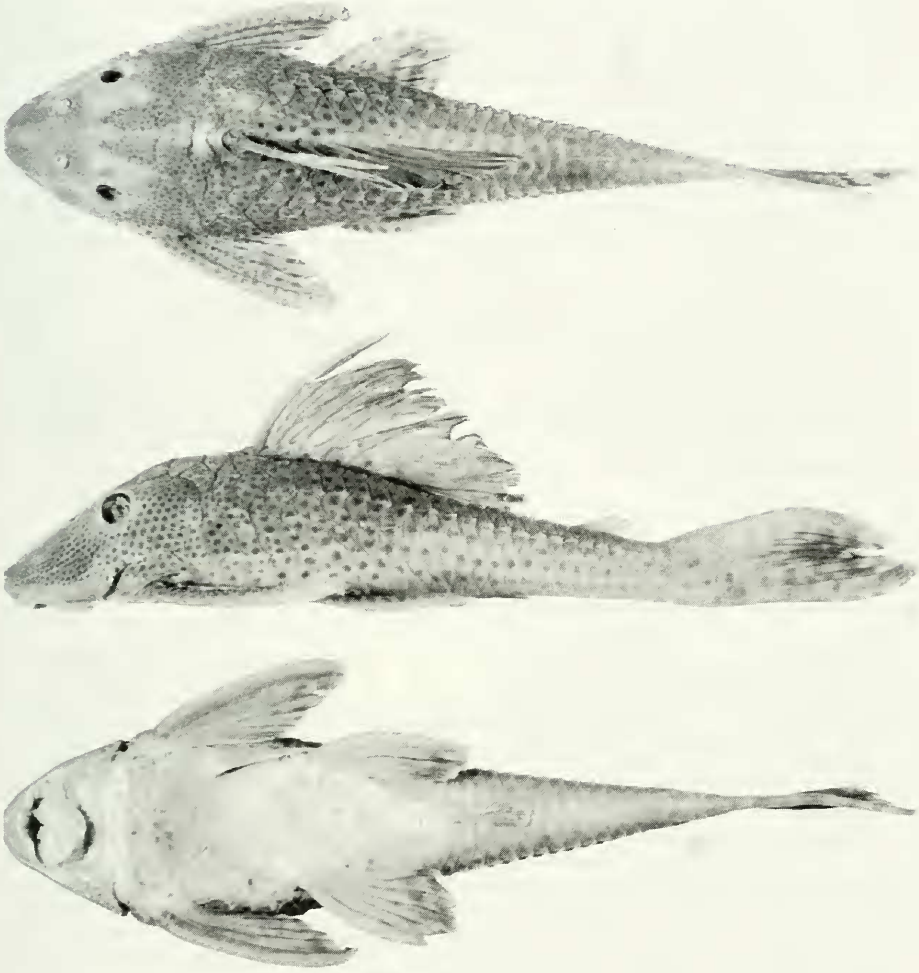

FIG. 2

Dorsal, lateral and ventral views of *Hypostomus waiampi* sp. n., MZUSP 82269, holotype (169.3 mm SL).

Body relatively deep and wide, covered with five rows of plates on each side; strong ridges, relatively smoother in younger specimens. Dorsal profile almost straight descending from dorsal-fin spine up to first plate after adipose fin. Caudal peduncle roughly ovoid in cross section, sometimes laterally compressed. Dorsal plates between end of dorsal fin and preadipose azyguous plate flattened dorsally, those closer to dorsal fin usually not meeting at midline, leaving naked central area. Ventral surface of head and abdomen completely covered by small platelets, except areas around urogenital opening, lower lip and fin insertions.

Pectoral fin spines covered with odontodes, progressively larger as approaching distal tip, hooked and more developed in larger specimens. Adipose-fin spine long and

straight, with slightly convex dorsal profile (Fig. 3A). Caudal fin concave to strongly concave. Medium sized outer rays; lower lobe longer than upper one. Dorsal fin usually reaching third preadipose plate when depressed.

Colour Pattern (in alcohol)

Ground colour light brownish, becoming cream in ventral area. Body covered by black close-set spots, smaller on anterior third, becoming larger and ill defined approaching caudal fin; in some specimens few larger and darker spots below dorsal and adipose fin. A lighter area forming a belt between eyes usually present. Darkened areas can be found under dorsal fin and, more faintly, on caudal peduncle. Ventral surface poorly spotted; pectoral and pelvic girdles, and area around the mouth clearly spotted.

Dorsal fin poorly and sparsely dotted to not dotted. Caudal fin with vertical rows of ill defined spots, becoming coalescent as approaching distal border. Adipose fin usually unspotted.

Distribution

Hypostomus waiampi is known only from its type locality, in the Cupixi River, State of Amapá, Brazil. It is syntopic with *H. simios*.

Hypostomus ericae sp. n. Figs 3, 4, 5 & 6; Tables 1 & 4

Hypostomus sp. 1: Hollanda Carvalho & Weber, 2003

Holotype: MNRJ 27861, 164.3 mm SL. Brazil: Goiás: Tocantins River Basin: Rio Tocantins, Porto Alfredinho, 14° 02' 22.1" S 48° 31' 28.6" W; October 1996; col.: D. A. Halboth, F. P. Matos & E. P. Caramaschi.

Paratypes: All specimens from Brazil: Goiás: Tocantins River Basin: MHNG 2650.025, 1 ex., 121.3 mm SL. Macaco river, left side tributary, 14° 21' 30"S 49° 5' W; 7th October 1985; col.: G. W. Nunan & D. F. Moraes Jr. – MHNG 2650.026, 1 ex., 130.8 mm SL. Maranhão river, next to Palmeiras stream mouth, left side next to Porto Alfredinho; 7th October 1996; col.: E. P. Caramaschi; D. F. Moraes Jr. & D. A. Halboth. (GenBank number for PSM 06-2053: AJ 318347). – MHNG 2650.027, 3 ex., 114.6 – 146.0 mm SL. Maranhão river, next to Peixe river falls; 10th October 1996; col.: E. P. Caramaschi; D. F. Moraes Jr. & D. A. Halboth. – MHNG 2650.028, 1 ex., 170.1 mm SL. Almas river; 12th October 1996; col.: E. P. Caramaschi; D. F. Moraes Jr. & D. A. Halboth. – MNRJ 24251, 1 ex., 115.0 mm SL. Left side of UHE Serra da Mesa dam, Palmeirinha river affluent, Porto Serrinha station, 14° 02' 58"S 48° 29' 57" W; 16th December 1995; col.: D. F. Moraes Jr. & D. A. Halboth. – MNRJ 24252, 1 ex., 139.0 mm SL. Left side of UHE Serra da Mesa dam, Palmeirinha river affluent, Porto Serrinha station, 14° 02' 58"S 48° 29' 57" W; 10th August 1996; col.: D. F. Moraes Jr. & D. A. Halboth. – MNRJ 24253, 1 ex., 161.0 mm SL. Maranhão river, next to Peixe river falls, 14° 14' 54"S 48° 55' 59" W; 31st January 1996; col.: D. F. Moraes Jr. & F. P. Matos. – MNRJ 24254, 1 ex., 111.0 mm SL. Maranhão river, next to Peixe river falls, 14° 14' 54"S 48° 55' 59" W; 17th April 1996; col.: D. F. Moraes Jr. & F. P. Matos. – MNRJ 24255, 1 ex., 139.0 mm SL. Maranhão river, next to Peixe river falls, 14° 14' 54"S 48° 55' 59" W; 11th November 1996; col.: D. F. Moraes Jr. & F. P. Matos. – MNRJ 24256, 1 ex., 138.0 mm SL. Maranhão river, next to Peixe river falls, 14° 14' 54"S 48° 55' 59" W; 11th December 1996; col.: D. F. Moraes Jr. & F. P. Matos. – MNRJ 24257, 1 ex., 149.0 mm SL. Maranhão river, next to Peixe river falls, 14° 14' 54"S 48° 55' 59" W; 11th February 1997; col.: D. F. Moraes Jr. & F. P. Matos. – MNRJ 24258, 3 ex., 120.0 – 133.0 mm SL. Passa Três river, 14° 28' 39"S 49° 04' 33" W; 26th June 1996; col.: D. F. Moraes Jr. – MNRJ 24259, 1 ex., 154.0 mm SL. Right side of UHE Serra da Mesa dam, upstream of Castelo

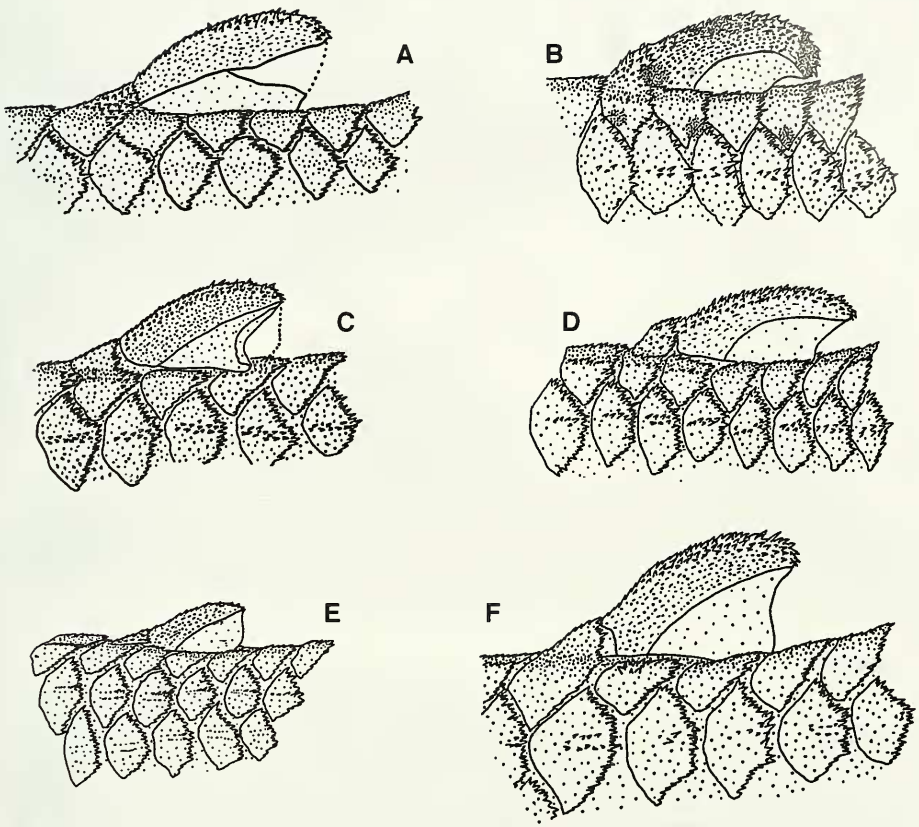

FIG. 3

Adipose fin and spine of: A. *Hypostomus waiampi* sp. n., MZUSP 82270; B. *H. ericae* sp. n., MNRJ 27861 (holotype); C. *H. paucipunctatus* sp. n., MZUSP 82271 (holotype); D. *H. soniae* sp. n., MZUSP 82272 (holotype); E. *H. simios* sp. n., MZUSP 34236; F. *H. hemicochliodon*, Armbruster, 2003, MZUSP 34624.

Grande river, upper Tocantins river, 14° 08' 03"S 48° 44' 23" W; 12th November 1996; col.: D. F. Moraes Jr. – MNRJ 24260, 1 ex., 128.0 mm SL. Almas river, 14° 37' 03"S 49° 03' 12" W; 9th December 1997; col.: D. F. Moraes Jr., D. A. Halboth & A. Suppa. – MNRJ 24261, 1 ex., 184.0 mm SL. Almas river, 14° 37' 03"S 49° 03' 12" W; 10th December 1997; col.: D. F. Moraes Jr., D. A. Halboth, A. Suppa & J. L. C. Novaes. – MNRJ 24262, 1 ex., 134.0 mm SL. Almas river, 14° 37' 03"S 49° 03' 12" W; 10th February 1998; col.: D. F. Moraes Jr., D. A. Halboth & A. Suppa. – MNRJ 24263, 1 ex., 164.0 mm SL. Bagagem river, upstream of a "remanso" of UHE Serra da Mesa dam; 9th June 1997; col.: D. F. Moraes Jr., D. A. Halboth & A. Suppa. – MNRJ 24264, 1 ex., 199.0 mm SL. Left side of UHE Serra da Mesa dam, affluent of Traíras river, upper Tocantins, 14° 12' 14"S 48° 32' 11" W; 9th June 1997; col.: D. F. Moraes Jr., D. A. Halboth & A. Suppa. MNRJ 27862, 1 ex., 118.0 mm SL. Das Almas river, 14° 37' 51.2" S 49° 01' 56.6" W; April 1996; col.: D. F. Moraes Jr. & J. K. Brondi. – MNRJ 27863, 4 ex., 104.6 – 128.3 mm SL. Bagagem river, 14° 22' 03.3" S 48° 12' 08.1" W; October 1996; col.: D. F. Moraes Jr, J. K. Brondi & E. P. Caramaschi.

Derivatio nominis. This species is dedicated to Érica Pellegrini Caramaschi, collector of this species, and professor and researcher at the Universidade Federal do Rio de Janeiro (UFRJ), for her great contributions to the knowledge of ecology of fishes.

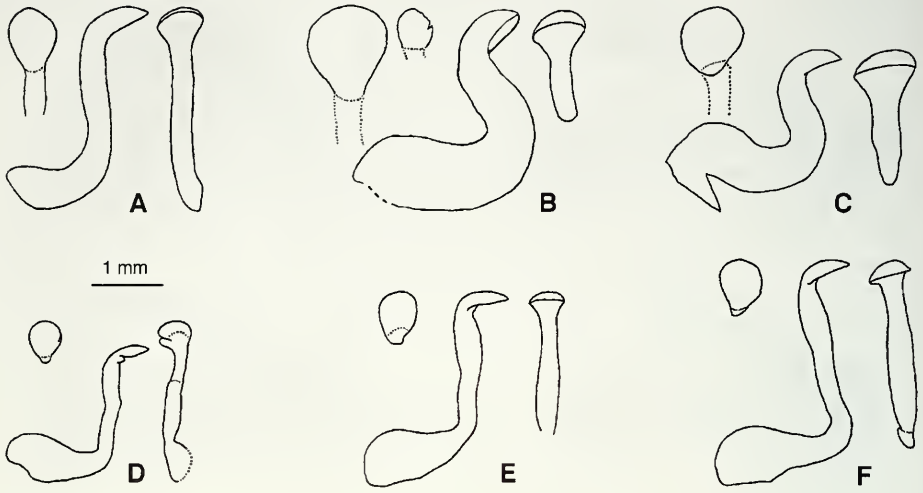

FIG. 4
Posterior, lateral and anterior views of replacement teeth from upper right jaw: A. *Hypostomus waiampi* sp. n.; B. *H. ericae* sp. n.; C. *H. paucipunctatus* sp. n.; D. *H. soniae* sp. n.; E. *H. simios* sp. n.; F. *H. hemicochliodon* Armbruster, 2003.

DIAGNOSIS

Hypostomus ericae is distinguished from *H. soniae*, *H. sculpodon*, *H. simios* and *H. hemicochliodon* by the number of odontodes in the opercle (0 to 10 versus more than 10); from *H. waiampi*, *H. oculeus* and *H. pyrineusi* by its colour pattern, with widely spaced spots covering its body (versus close-set spots; Figs 2 & 5), from *H. ericius*, by the presence of a buccal papilla (versus absence), from *H. paucipunctatus* by a deeper caudal peduncle (2.3 to 3.0 in caudal peduncle length versus 1.8 to 2.3), darker body colour and less vertebrae (31 versus 33 on holotypes); from *H. levis* it is distinguished by the presence of an adipose fin (versus absence). Its low number of teeth (6 to 9) also distinguishes it from *H. levis*, *H. soniae*, *H. simios* and *H. sculpodon* (more than 10); its particular adipose fin spine, strongly curved in adult specimens (Fig. 3B) distinguishes it from all species of *Hypostomus cochliodon* group of Amazon Basin.

MORPHOLOGY

Standard length of examined specimens 104.6 to 199.0 mm; meristic and morphometric data in Tables 1 & 4.

Head dorsally covered with dermal ossifications, except for a small amorphous naked area on snout tip, as large as nostril. Profile almost straight, with a light depression between eyes. Dorsal margin of orbit slightly elevated, weakly continuing in an inconspicuous ridge on postemporal plate and following plates. A single plate bordering posterior margin of supraoccipital plate, sometimes subdivided in two. Opercle supporting less than 10 odontodes. Outer face of upper lip covered with small odontodes, concentrated on middle and distal areas in smaller specimens. Barbells

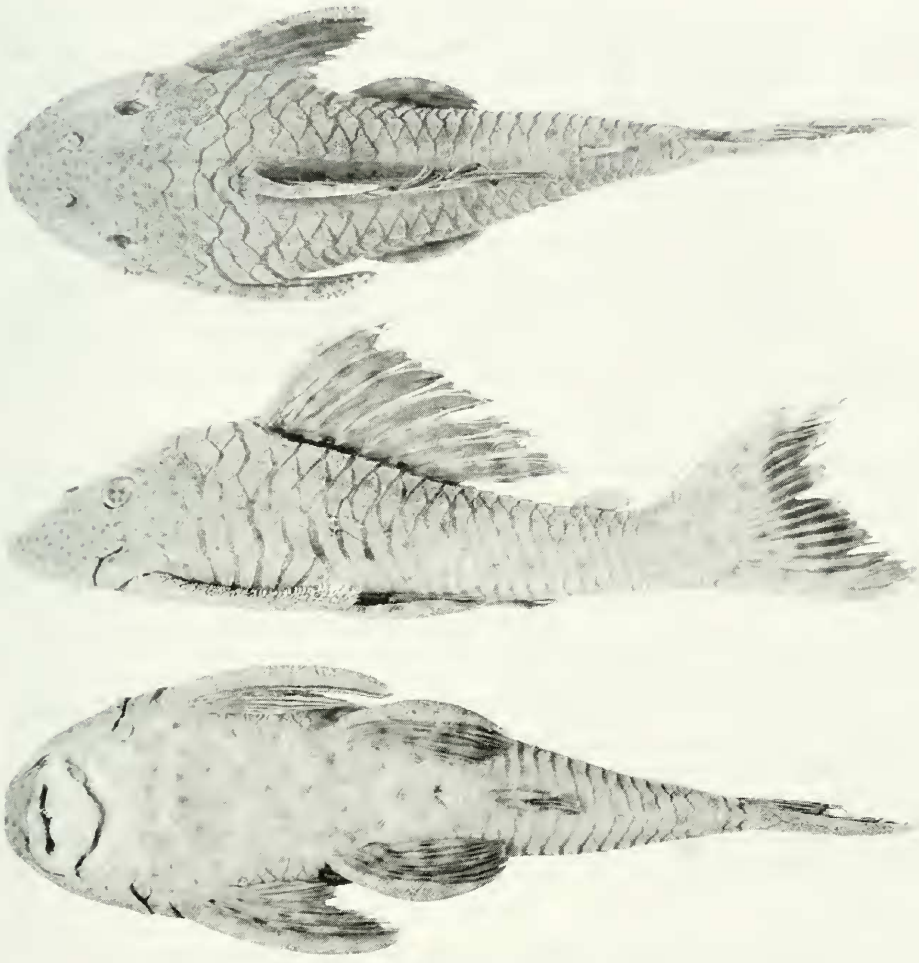

FIG. 5

Dorsal, lateral and ventral views of *Hypostomus ericae*, sp. n., MNRJ 27861, holotype (164.3 mm SL).

short. Few (6 to 9) large spoon shaped teeth, with a small outer cuspid in younger specimens.

Body relatively deep and wide, covered with five rows of plates on each side, slightly smoother in younger specimens. Dorsal profile almost straight descending from dorsal-fin spine usually up to second plate after adipose fin. Caudal peduncle roughly ovoid in cross section, sometimes laterally compressed. Dorsal plates between end of dorsal fin and adipose spine flattened in their dorsal portion, those closer to dorsal fin usually not meeting at midline, leaving naked central area. Ventral surface of head and abdomen completely covered by small platelets, except areas around urogenital opening, lower lip and fin insertions, and in some specimens a small naked area in the middle of coracoidal band.

Pectoral fin spines covered with odontodes, progressively larger as approaching distal tip, hooked and more developed in larger specimens. Adipose fin spine long and strongly curved, tip more curved in larger specimens (Fig. 3B). Caudal fin concave to strongly concave. Medium sized outer rays; lower lobe longer than upper one. Dorsal fin usually reaching up to the first or second preadipose plate when depressed.

Colour Pattern

In alcohol. Ground colour of dorsal surface light brown to dark brown. Darkened regions under dorsal fin, caudal peduncle, and dorsal and frontal areas of head.

Ventral surface usually cream coloured, lighter in the head from mouth to gill openings. Body completely covered by few widely spaced spots, smaller on the anterior third, becoming fainter and sparse on body and fins. Lighter area forming a belt between the eyes usually present.

Ventral surface covered by few spots; area from opercular openings to mouth usually not or poorly spotted.

Fins with rows of larger, darker and ill defined spots, which become coalescent as approaching distal borders. The caudal fin is lighter as far as the proximal third of the upper ray and spotted in the border, sometimes as a "half-moon" shaped area extended from the upper to lower spine (fig. 6). Adipose fin spotted on tip and base of spine; in larger specimens one spot on dorsal surface usually present. Sometimes border of adipose membrane darkened.

Living specimen. Ground colour lighter, with spots and stripes better defined and more contrasting. Darkened belt present from tip of snout to mid distance between nostrils, and also darkened areas on opercle and square area between eyes and dorsal spine. Fading dark vertical bars under dorsal fin and caudal peduncle. Belly with strong creamy colouration. Lips and ventral area between opercular openings and mouth with yellowish colouration.

Distribution

Upper Tocantins River drainage, State of Goiás, Brazil, on the region of influence of the Serra da Mesa dam.

Hypostomus paucipunctatus sp. n. Figs 3, 4 & 7; Tables 2 & 4

Hypostomus sp. 2: Hollanda Carvalho & Weber, 2003

Holotype: MZUSP 82271, 177.1 mm SL. Brazil: Pará: municipality of Caldeirão, Itacaiúnas River, Igarapé Pojuca, Serra dos Carajás (5°52'S; 50°32'W; coordinates of Itacaiúnas River, near Castanhal, field nb. MIG 83101503); 15 October 1983; col. Michael Goulding.

Paratypes: MHNG 2652.017, 2 ex., 137.8 – 157.9 mm SL; MZUSP 34260, 1 ex., 134.1 mm SL. Same data as holotype. – MZUSP 34259, 11 ex., 147.5 – 188.0 mm SL. Brazil: Pará: Itacaiúnas River, Serra dos Carajás, Caldeirão (5°52'S; 50°32'W, field nb. MIG 83060007); June – July 1983; col. Michael Goulding.

Other specimen examined: ZMA 120.160, 1 ex., 165.3 mm SL. Same data as holotype.

Derivatio nominis. From the Latin paucus, few and punctatus, dotted, in allusion to the colour pattern.

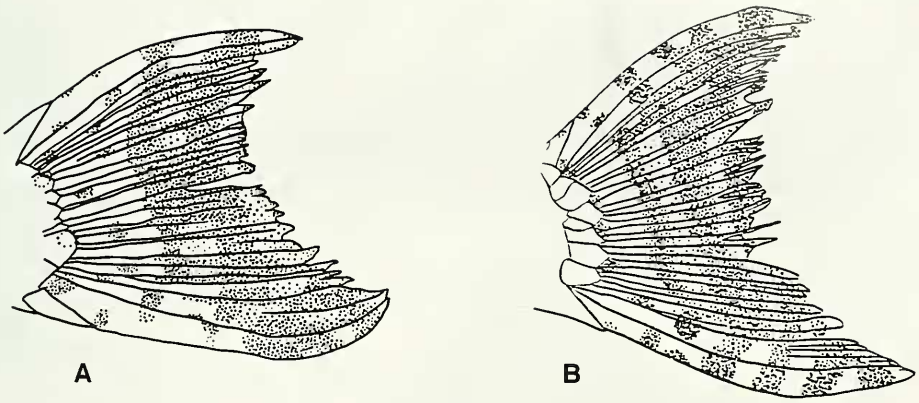

FIG. 6

Caudal fin of *Hypostomus ericae* sp. n., showing the range of its pattern from less pigmented (left) to more pigmented (right); A. MNRJ 27861, holotype (164.3 mm SL); B. MNRJ 15248 (146.0 mm SL).

DIAGNOSIS

Hypostomus paucipunctatus is distinguished from *H. soniae*, *H. sculpodon*, *H. simios* and *H. hemicochliodon* by the number of odontodes in the opercle (less than 10 versus more than 10); from *H. waiampi*, *H. oculeus* and *H. pyrineusi* by its colour pattern, with widely spaced spots covering the body (versus close-set spots; Figs 2 & 7); from *H. ericius*, by the presence of a buccal papilla (versus absence); from *H. ericae* by a lower caudal peduncle (1.8 to 2.3 in caudal peduncle length versus 2.3 to 3.0), lighter body colour and more vertebrae (33 versus 31); from *H. levis* by the presence of adipose fin (versus absence). Its low number of teeth (6 to 10) also distinguishes it from *H. levis*, *H. soniae*, *H. simios* and *H. sculpodon* (more than 10).

MORPHOLOGY

Standard length of examined specimens 134.1 to 188.0 mm; meristic and morphometric data in Tables 2 & 4.

Head dorsally covered with dermal ossifications, except for small amorphous naked area on snout tip, as large as nostril. Profile slightly convex, but lightly depressed in area between the eyes. Dorsal margin of orbit slightly elevated, weakly continuing in inconspicuous ridge on postemporal plate and following plates. A single plate bordering posterior margin of supraoccipital. Opercle supporting less than 10 odontodes. Outer face of upper lip covered by small odontodes. Barbells short. Few (6 to 10) large spoon-shaped teeth.

Body relatively deep, covered with five rows of plates on each side, relatively smoother in younger specimens. Dorsal profile almost straight descending from dorsal-fin spine usually up to second plate after adipose fin. Caudal peduncle ovoid in cross section, laterally compressed in smaller specimens. Dorsal plates between end of dorsal fin spine and adipose spine flattened in their dorsal portion; those closer to dorsal fin usually not meeting at midline, leaving naked central area. Abdomen and ventral

FIG. 7

Dorsal, lateral and ventral views of *Hypostomus paucipunctatus* sp. n., MZUSP 82271, holotype (177.1 mm SL).

surface of head completely covered by small platelets, except the areas around urogenital opening, lower lip and fin insertions.

Pectoral fin spines covered with odontodes, progressively larger as approaching distal extremity and more developed and hooked in larger specimens. Adipose fin spine long and slightly curved (Fig. 3C). Caudal fin concave to strongly concave. Medium sized outer rays; lower lobe longer than upper one. Dorsal fin usually reaching second plate before adipose fin spine when depressed.

COLOUR PATTERN (in alcohol)

Ground colour of dorsal surface light brown, with olivaceous greenish areas in some specimens, becoming lighter in the posterior half. Darkened regions under dorsal fin, and top and frontal areas of the head. Ventral surface colour and caudal peduncle, sometimes lighter; region from opercular openings to mouth usually lighter than belly.

Body completely covered by few widely spaced black dots, smaller in the anterior third, becoming sparse as approaches caudal fin. Darkened areas can be found under dorsal fin and, more faintly, on caudal peduncle and head. A lighter area forming a belt between eyes is usually present. Ventral surface covered by ill defined dots; area from opercular openings to mouth usually not or poorly dotted.

Fins usually ostensibly dotted, except anal fin. Dorsal fin dots coverage ranging from all surface, sometimes with inconspicuous horizontal rows, to very few dots only on the rays. On caudal fin, ranging from well defined blotches, progressively more concentrated at distal region. Adipose fin usually with one spot at its membrane and one or two spots on the spine, but generally not on spine extremity.

DISTRIBUTION

Found in the Rio Itacaiúnas drainage, Serra dos Carajás, State of Pará, Brazil.

Hypostomus soniae sp. n. Figs 3, 4 & 8; Tables 2 & 4

Holotype: MZUSP 82272, 140.2 mm SL. Brazil: Pará: temporary pools on the riversides of the Rio Tapajós, between Vila Nova and Urua (station nb. 10); 26 – 28 September 1992; col. R. Stawikowski, S. Muller, P. Ludwig, C. Schaefer & B. Kilian.

Paratypes: MZUSP 82273, 3 ex., 48.6 – 112.5 mm SL. Same data as holotypes. – INPA 21972, 3 ex., 47.7 – 104.3 mm SL. Same data as holotype – MHNG 2547.012, 13 ex., 35.6 – 145.8 mm SL. Same data as holotype. – MNRJ 27864, 1 ex., 98.5 mm SL. Same data as holotype.

Derivatio nominis. This species is dedicated to Sonia Fisch-Muller, curator at the Museum of Geneva, specialist in loricariid systematics and one of the collectors of the type series.

DIAGNOSIS

Hypostomus soniae is distinguished from all other species of *Hypostomus cochliodon* group from the Amazon Basin by its particular colour pattern without spots, sometimes with darker longitudinal stripes (versus spotted pattern, without stripes), its particular long and slightly curved adipose fin spine (Fig. 3D), a pair of ridges between nostrils (see description), and its low number of plates in lateral line (25 to 27 versus 27 to 31). It is also distinguished from *H. waiampi*, *H. oculeus*, *H. pyrineusi*, *H. ericius*, *H. ericae* and *H. paucipunctatus* by the number of odontodes in the opercle (more than 10 versus less than 10); it is distinguished from *H. levis* by the presence of an adipose fin (versus absence).

It is further distinguished from *H.* aff. *soniae* (*Hypostomus* sp. 1 in Weber & Montoya-Burgos, 2002), found in Paraguay River Basin by the absence of plates in the skin around dorsal fin (versus presence), colour pattern never spotted (versus sometimes spotted), a lower range of number of plates in lateral line (25 to 27 versus 26 to 30), and never less than 12 teeth (versus 6 – 27 teeth).

MORPHOLOGY

Standard length of examined specimens 76.4 to 145.8 mm; meristic and morphometric data in Tables 2 & 4.

Head relatively rough, with overall shape lines very well marked, almost "geometric", dorsally covered with dermal ossifications, except for small amorphous naked area on snout tip, as large as nostril. Profile straight to slightly convex; tip of occipital plate higher than first predorsal plate. Dorsal margin of orbit slightly elevated, weakly

FIG. 8

Dorsal, lateral and ventral views of *Hypostomus soniae*, sp. n., MZUSP 82272, holotype (140.2 mm SL).

continuing in inconspicuous ridge on postemporal plate and following plates. A pair of small parallel ridges between the nostrils, shorter than orbital diameter. A single plate bordering posterior margin of supraoccipital. Opercle supporting more than 10 odon-

todes. Outer face of upper lip covered with small odontodes, concentrated on middle and distal areas in smaller specimens. Barbells short. Numerous teeth (11 to17) with a small outer cuspid.

Body relatively short and rough, covered with five rows of plates on each side, relatively smoother in younger specimens. Dorsal profile almost straight descending from dorsal-fin spine usually up to membrane of adipose fin. Caudal peduncle high and roughly ovoid in cross section, sometimes slightly laterally compressed. Predorsal and dorsal plates between end of dorsal fin and preadipose azyguous plate flattened in their dorsal portion, those closer to the last dorsal fin rays usually not meeting at midline, leaving naked central area. Abdomen and ventral surface of head completely covered by small platelets, except areas around the urogenital opening, lower lip and fin insertions, and a small naked area in the middle of pectoral girdlle; large naked areas around pelvic insertions in smaller specimens due to ontogeny.

Pectoral fin spines covered with odontodes, progressively larger as approaching distal extremity. Adipose-fin spine long and slightly curved (Fig. 3D). Caudal fin concave to strongly concave. Medium sized outer rays; lower lobe longer than upper one. Dorsal fin when laid down usually reaching the preadipose plate.

Colour Pattern (in alcohol)

Ground colour greenish-brown to dark brown, becoming lighter in the posterior half. Ventral surface cream to greenish-cream coloured. Dots or spots completely absent in body surface and fins. Few specimens with a faint longitudinal dark stripe along lateral line.

Distribution

Hypostomus soniae is only known from its type locality, in the Tapajós River, State of Pará, Brazil.

Hypostomus simios sp. n. Figs 3, 4 & 9; Tables 3 & 4

Holotype MZUSP 82268, 157.9 mm SL. Brazil: Amapá: bridge on the road to *Serra do Navio*, Cupixi river (station nb. MIG 84010006); January 1984; col. Michael Goulding.

Paratypes MZUSP 34236, 3 ex., 107.3 – 155.2 mm SL; MHNG 2652.018, 1 ex., 113.5 mm SL. Same data as holotype.

Derivatio nominis. From the Greek "simios", meaning snub nosed, in allusion to its profile. Invariable epithet.

Diagnosis

Hypostomus simios is distinguished from *H. waiampi*, *H. oculeus*, *H. pyrineusi*, *H. ericius*, *H. ericae* and *H. paucipunctatus* by the number of odontodes in the opercle (more than 10 versus less than 10); from *H. soniae* by its colour pattern (spotted versus unspotted, sometimes with longitudinal stripes); from *H. sculpodon* by the pattern of spots on body (widely spaced versus close-set spots) and larger interorbital width (2.0 to 2.2 in head length versus 2.2 to 2.6); from *H. hemicochliodon* by its upper margin of orbits elevated, higher than frontal head profile (versus eye orbits at the same level of frontal head profile) and occipital bone, whose tip is higher than first predorsal plate (versus tip at the same level); from *H. levis* by the presence of adipose fin (versus absence).

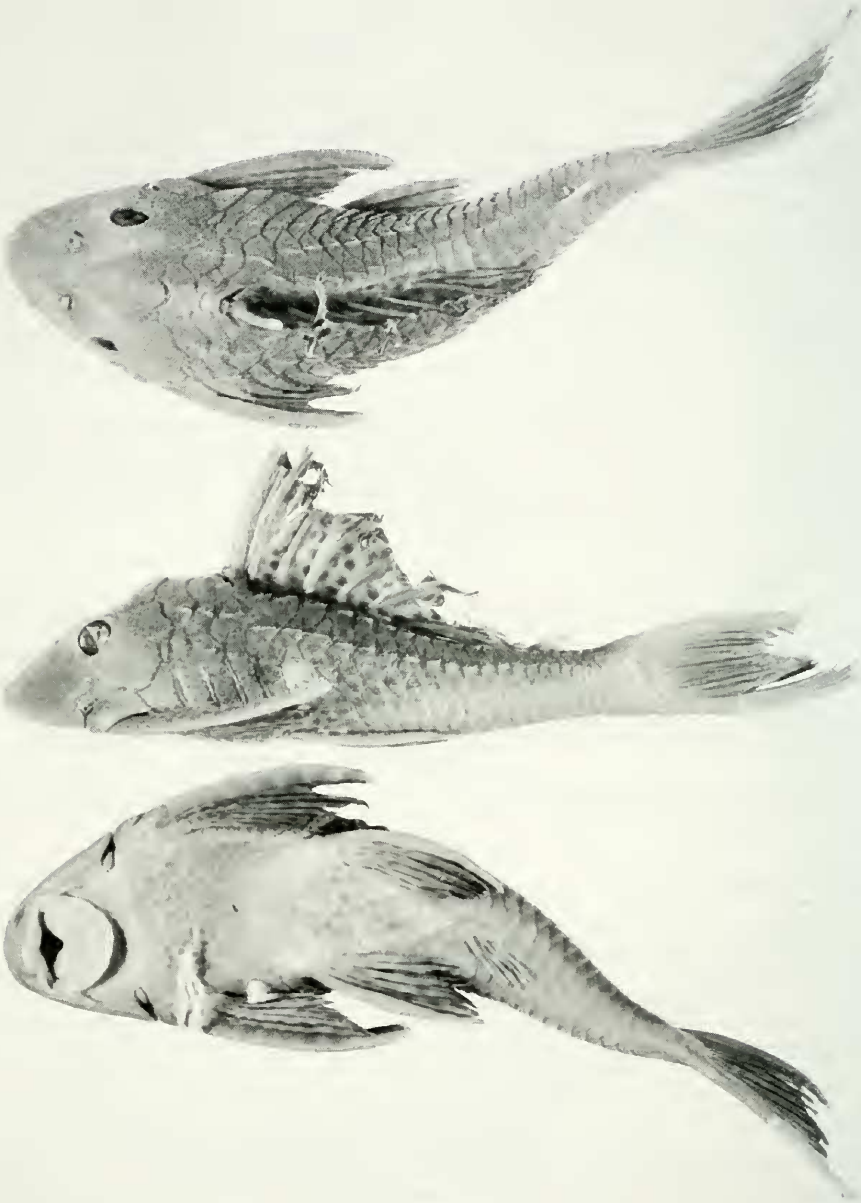

FIG. 9

Dorsal, lateral and ventral views of *Hypostomus simios* sp. n., MZUSP 82268, holotype (177.1 mm SL).

MORPHOLOGY

Standard length of examined specimens 108.8 to 157.9 mm; meristic and morphometric data in Tables 3 & 4.

Head dorsally covered with dermal ossifications, except for small amorphous naked area on snout tip, as large as nostril. Profile almost straight, with light depression between eyes; tip of occipital higher than first predorsal plate. Orbits large with dorsal margin very elevated, weakly continuing in inconspicuous ridge on postemporal plate and following plates. A single plate bordering posterior margin of supraoccipital. Opercle supporting more than 10 odontodes. Outer face of upper lip covered with small odontodes. Barbells short. Several small spoon-shaped teeth (12 to 15) with a small outer cuspid in younger specimens.

Body relatively deep and wide, covered with five rows of plates on each side, relatively smoother in younger specimens. Ridges well developed on largest specimen (holotype). Dorsal profile almost straight descending from dorsal-fin spine usually up to the second plate after adipose fin. Caudal peduncle roughly ovoid in cross section, sometimes slightly laterally compressed. Dorsal plates between end of dorsal fin and preadipose azyguous plate flattened in their dorsal portion, those closer to dorsal fin usually not meeting in the midline, leaving naked central area. Abdomen and ventral surface of the head covered by small platelets, except the areas around urogenital opening, lower lip and fin insertions, and in some specimens a small naked area in the middle of the pectoral girdle.

Pectoral-fin spines covered with odontodes, slightly larger as approaching distal tip, and more developed in larger specimens. Adipose fin spine slightly curved (Fig. 3E). Caudal fin concave to strongly concave. Medium sized outer rays; lower lobe longer than upper one. Dorsal fin when laid down usually reaching up to the first or second preadipose plate.

Colour Pattern (in alcohol)

Ground colour reddish-brown becoming lighter in the posterior half. Ventral surface cream coloured; a transverse darkened belt between pelvic and pectoral waist on largest specimen (holotype). Dark areas can be found under the dorsal fin.

Body covered by black close-set spots, smaller in the anterior third, becoming ill-defined, sometimes disappearing, as approaches caudal fin. Ventral surface spotted only on belly and area around the mouth, almost in a mosaic pattern.

Dorsal, pectoral and pelvic fins with spots arranged in longitudinal rows, increasing in size as approaching distal border. Caudal fin with ill defined spots on upper lobe; lower lobe darker. Anal fin with faint ill defined spots. Adipose fin and spine unspotted.

Distribution

Hypostomus simios is only known from its type locality, in the Cupixi River, State of Amapá, Brazil. This species is syntopic with *H. waiampi*.

Hypostomus hemicochliodon Armbruster, 2003 Figs 3, 4 & 10; Tables 3 & 4

MZUSP 34210, 8 ex., 148.3 – 229.6 mm SL; MHNG 2652.019, 2 ex., 173.7 – 174.6 mm SL. Brazil: Roraima: municipality of Marará, Branco River (field nb. MIG 79102901); 29 October 1979; col. Michael Goulding.

FIG. 10

Dorsal, lateral and ventral views of *Hypostomus hemicochliodon* Armbruster, 2003, MZUSP 34626, (169.0 mm SL).

MORPHOLOGY

Standard length of examined specimens 148,3 mm to 229,6 mm; meristic and morphometric data in Tables 3 & 4.

Head dorsally covered with dermal ossifications, except for small amorphous naked area on snout tip, as large as nostril, on smaller specimens. Profile slightly convex, but lightly depressed between eyes.

Dorsal margin of orbit slightly elevated, weakly continuing in inconspicuous ridge on postemporal plate and following plates. A single plate bordering posterior margin of supraoccipital. Body relatively deep, covered with five rows of plates on each side, relatively smoother in younger specimens. Opercle supporting more than 10 odontodes. Outer face of upper lip covered by small odontodes. Barbells short. Several smalls spoon-shaped teeth (13 to 18) with a small outer cusp in younger specimens.

Dorsal profile almost straight descendant from dorsal fin spine usually up to the precaudal azyguous plates. Caudal peduncle ovoid in cross section, laterally compressed in smaller specimens. Predorsal and dorsal plates between end of dorsal fin and preadipose azyguous plate flattened in their dorsal portion, those closer to the last dorsal fin rays usually not meeting in the midline leaving naked central area. Abdomen and ventral surface of head completely covered by small platelets, except the areas around urogenital opening, lower lip and fin insertions. One specimen with two small amorphous naked areas on pectoral girdle.

Pectoral-fin spines covered with odontodes, progressively larger as approaching distal extremity, hooked and more developed in larger specimens. Adipose-fin spine long and slightly curved (Fig. 3F). Caudal fin concave to strongly concave; medium sized outer rays. Dorsal fin when laid down usually reaching the second plate before adipose fin spine. A few platelets on the skin around the dorsal fin spine are often present in larger specimens.

Colour Pattern (in alcohol)

Ground colour cream to brownish. Ventral surface coloured as caudal peduncle, sometimes lighter; region from opercular openings to mouth usually lighter than belly. Body completely covered by few black close-set spots, smaller in the anterior third, becoming fainter or disappearing as approaching caudal fin.

Fins spotted. Lower lobe of caudal fin darker than upper one; dorsal fin can form vertical rows and/or mosaic. Adipose usually not spotted.

Distribution

This population of *Hypostomus hemicochliodon* was collected at Branco River, in Roraima, Brazil.

COMMENTS ON THE REDESCRIPTION OF *HYPOSTOMUS COCHLIODON* KNER, 1854 BY ARMBRUSTER (2003)

Kner's (1854) original description of *Hypostomus cochliodon* is based on five syntypes[1] of 184.4 to 210.7 mm total length, collected by Natterer. For the description of the colour pattern, Kner (1854:266) quotes Natterer's field notes: *The dominating colour is a rather light yellowish-greybrown; the head, specially at the parting* [top of the head], *with few, blackish, small round spots, not more than 3-4 along the whole*

[1] Designation of a lectotype for *H. cochliodon* in Armbruster, 2003: 21, is no longer valid in accordance with the Article 74.7.3 of the ICZN (ICZN, 2003).

trunk. The fins show at their bases the same colour as the body, while their respective tips are coloured a brownish-black. All fins are covered by a few black spots both on their skin [membrane] *as well as on their rays.* [translated from German].

In a revision of the species of the *Hypostomus cochliodon* group, Armbruster (2003) mentions that "*Hypostomus cochliodon* as presently delimited may represent more than one species" but he prefers to regard the material examined as a single species, by the fact that "opercular odontode number does not appear correlated with variations in other characteristics". Nevertheless, the redescription of *Hypostomus cochliodon* Kner, 1854 has to fit with the original description as long as the identity of this species is not clearly established among the populations of the Paraguay river basin. Armbruster's description concerns a form or a species of *Hypostomus* that does not fit with characters given in Kner (1854).

In Armbruster's description, the colour pattern characterizes a species "almost entirely brown" with two tan stripes along the body and occasionally with sparse small spots. Specimens entirely dark brown with no spots are also mentionned. Both colour patterns are in contradiction with Kner's original description. Aside from two syntypes (NMW 46277, alcohol preserved, and NMW 44101 stuffed and alcohol preserved), both showing unconspicuous remains of original colour patterns, Armbruster did not examine any "form" with rather light background and therefore no true *Hypostomus cochliodon*. The other characters given by Armbruster are not diagnostic enough, and seem to cover a too large range of value for a single species (e.g. number of teeth (6 to 27), odontodes on opercle (0 to 30) and most morphometric ratios).

Considering the discrepancy between original description and diagnostic characters given in Armbruster's redescription, it is prematurate, at this time, to establish the identity of the Paraguayan populations. Such a confuse situation needs additional data before stating any definite conclusion. Collecting molecular data, based on specimens of different patterns, as well from Paraguayan streams as from those close to the type locality, seems to be the most appropriate strategy for further studies on *Hypostomus cochliodon* group of the Paraguay drainage.

Within the Paraguayan specimens of the *Hypostomus cochliodon* group examined by us, part of them fits with the dark brown tan stripped pattern of *Hypostomus cochliodon* as in Armbruster, 2003. Sharing the same colour pattern with *Hypostomus soniae* sp. n., these are provisionally named *Hypostomus* aff. *soniae*.

DISCUSSION

The five new *Hypostomus* species described herein are considered to be part of *Hypostomus cochliodon* group (Weber & Montoya-Burgos, 2002; Montoya-Burgos *et al.*, 2002; Armbruster, 2003) because of their highly angled jaws and the presence of few spoon-shaped teeth, with a small lateral cusp (see Armbruster, 2003) fused to the main one or, as in *H. soniae*, intermediately developed with a small lateral cusp.

Considering the four phenetic subgroups of the *Hypostomus cochliodon* group defined by Armbruster (2003), *H. ericae*, *H. waiampi* and *H. paucipunctatus* are placed in the "odontodeless opercle group", while *H. simios* and *H. soniae* fall within the "intermediate group", as it has an opercle supporting several odontodes and intermediately developed teeth. *H. soniae* share the same colour pattern with *H.* aff. *soniae*. If

they are really closely related, they may have arisen from an ancestral species after the isolation of the Paraguay and the Amazon River Basin during the late Tertiary, between 10 and 12 million of years ago (Lundberg *et al.*, 1998; Montoya-Burgos, 2003).

The similar overall body shape and dimensions of the species of the *Hypostomus cochliodon* group make the differentiation by morphometric data very difficult, as already stated by Armbruster (2003). Measurements on large series of fishes, including small specimens, results in a great amplitude of ratios of body proportions and large overlaping values among different species. As morphometry is frequently feeble to delimit these fishes, specific characters were detailed in the descriptions. The curved shape of the adipose fin, which becomes more evident in larger fishes, clearly distinguishes *H. ericae* from all the others species of the group. Also for this species, the colour pattern of fins appears to be unique. *H. soniae* is basically differentiated from *H.* aff. *soniae* by subtle morphological characteristics and colour pattern (see diagnosis). For *H. simios*, the large orbital diameter is the most easily recognized character.

The five new species described here are known basically from their type localities and no further information on geographical distribution or morphological variation among different populations can be given. The population referred to *H. hemicochliodon* from Rio Branco (Brazil: Roraima: middle Amazon Basin) is slightly different from Armbruster's description (2003) based on populations from middle and upper Amazon Basin (plus two specimens from the lower basin, from Juruena and Xingu Rivers, respectively). Differences are based on variable characters, as background colour, which is lighter in the Rio Branco population; keels not very sharp or strong; and teeth almost always with lateral cusp fused to main one. Confirmation of its taxonomic status as separate species needs comparison of supplementary morphological data, as well as genetic data.

H. fonchii Weber & Montoya-Burgos, 2002 is not discussed in this work, as the species was excluded from *Hypostomus cochliodon* group by Armbruster (2003: 249). However, this group is paraphyletic according to molecular data (Montoya-Burgos *et al.*, 2002).

ACKNOWLEDGEMENTS

We wish to thank Volker Mahnert (MHNG), Sonia Fisch-Muller (MHNG), Francisco Langeani Neto (UNESP), Roberto E. Reis (PUCRS), for reviewing the article; Andreas Schmitz (MHNG) for the English, ancient German and Greek lessons; Juan Ignacio Montoya-Burgos (MHNG), Érica Pellegrini Caramaschi (UFRJ), and Alexandre Fort (MHNG) for their comments and suggestions; Paulo Andreas Buckup (MNRJ), Lúcia Rapp Py-Daniel (INPA), Osvaldo Takeshi Oyakawa (MZUSP), and José Lima Figueiredo (MZUSP) for the loan of specimens. We are also grateful to Arion T. Aranda and Renata Bartolette for the data on the fishes from MNRJ and Serra da Mesa, Claude Ratton for the photographs, Florence Marteau for the images, and Corinne Charvet for the technical support. The type series of *Hypostomus ericae* was collected during the project "Estudos Básicos sobre a Ictiofauna da UHE Serra da Mesa, GO", supported by Serra da Mesa Energia-FURNAS/BIORIO/UFRJ, (collecting license IBAMA, n° 03.198/96).

TABLE 1. Morphometric data of *Hypostomus waiampi* sp. n. and *Hypostomus ericae* sp. n.

	Hypostomus waiampi				*Hypostomus ericae*			
	n	holotype	range	mean ± SD	n	holotype	range	mean ± SD
Standard length in mm (A)	13	169.3	139.9-193.9	172.8±15.41	16	164.3	104.6-199.0	137.64±23.95
Ratio of standard length								
Predorsal distance (D)	10	2.68 (63.26)	2.51-2.71	2.63±0.07	28	2.48 (66.30)	2.23-2.78	2.53±0.10
Head length (E)	10	3.28 (51.62)	3.10-3.33	3.26±0.07	28	3.04 (54.00)	2.65-3.43	3.03±0.14
Dorsal fin spine length (K)	9	3.67 (46.08)	3.48-4.05	3.66±0.20	23	broken	3.08-3.90	3.53±0.23
Dorsal fin base length (L)	10	3.81 (44.47)	3.54-3.93	3.72±0.14	28	3.58 (45.90)	3.29-4.11	3.56±0.17
Interdorsal length (M)	10	4.43 (38.21)	4.04-4.76	4.43±0.20	28	5.55 (29.60)	4.49-6.03	5.16±0.35
Thoracic length (N)	10	4.53 (37.42)	4.11-4.53	4.30±0.14	28	4.36 (37.65)	3.67-4.65	4.16±0.22
Pectoral fin spine length (O)	10	3.50 (48.43)	3.18-3.50	3.31±0.10	28	3.21 (51.20)	2.87-3.47	3.20±0.14
Abdominal length (P)	10	5.22 (32.46)	4.73-5.22	4.97±0.15	28	4.89 (33.60)	4.57-5.54	5.05±0.25
Pelvic fin spine length (Q)	10	4.42 (38.31)	3.85-4.59	4.22±0.20	28	4.19 (39.25)	3.69-4.44	4.07±0.17
Caudal peduncle length (R)	10	2.95 (57.45)	2.86-3.11	2.99±0.08	28	3.15 (52.50)	2.92-3.55	3.24±0.15
Caudal peduncle depth (S)	10	11.95 (14.17)	10.65-12.24	11.50±0.50	28	8.69 (18.90)	7.69-9.45	8.86±0.38
Upper caudal ray length (U)	10	3.81 (44.44)	2.85-4.14	3.55±0.38	23	3.83 (42.90)	3.00-4.64	3.69±0.45
Lower caudal ray length (V)	9	3.39 (49.91)	3.02-3.67	3.27±0.22	21	3.47 (47.40)	2.73-4.31	3.22±0.45
Ratio of head length								
Cleithral width (F)	10	1.09 (47.49)	1.06-1.12	1.09±0.02	28	1.04 (52.00)	1.00-1.13	1.07±0.03
Head depth (G)	10	1.55 (33.29)	1.49-1.58	1.53±0.03	28	1.44 (37.60)	1.32-1.47	1.42±0.04
Snout length (H)	10	1.59 (32.5)	1.51-1.59	1.56±0.03	28	1.55 (34.80)	1.48-1.61	1.55±0.03
Orbital diameter (I)	10	6.00 (8.60)	5.50-6.20	5.86±0.25	28	5.74 (9.40)	5.04-6.20	5.58±0.31
Interorbital width (J)	10	2.25 (22.96)	2.13-2.27	2.21±0.05	28	2.03 (26.60)	1.69-2.04	1.84±0.09
Ratio of predorsal length								
Dorsal fin spine length (K)	9	1.37 (46.08)	1.30-1.50	1.38±0.07	23	broken	1.22-1.58	1.39±0.09
Ratios of caudal peduncle length								
Caudal peduncle depth (S)	10	4.05 (14.17)	3.60-4.08	3.85±0.17	28	2.76 (18.90)	2.29-2.98	2.74±0.16
Adipose fin spine length (T)	10	5.04 (11.40)	4.15-5.51	4.75±0.41	28	4.70 (11.10)	3.80-5.62	4.76±0.42
Ratio of interorbital width								
Right mandibular ramus (RM)	10	3.11 (7.38)	2.98-3.51	3.15±0.15	28	4.03 (6.60)	3.54-6.21	4.47±0.60

TABLE 2. Morphometric data of *Hypostomus paucipunctatus* sp. n. and *Hypostomus soniae* sp. n.

	Hypostomus paucipunctatus				*Hypostomus soniae*			
	n	holotype	range	mean ± SD	n	holotype	range	mean ± SD
Standard length in mm (A)	13	177.1	134.1-188.0	166.03±16.89	13	140.2	76.4-145.8	105.87±25.43
Ratio of standard length								
Predorsal distance (D)	16	2.66 (66.53)	2.47-2.79	2.62±0.09	13	2.37 (59.13)	2.34-2.53	2.41±0.05
Head length (E)	16	3.44 (51.47)	2.77-3.46	3.23±0.18	13	2.97 (47.16)	2.77-3.07	2.90±0.10
Dorsal fin spine length (K)	11	3.63 (48.83)	3.25-4.82	3.71±0.52	11	3.05 (46.03)	2.65-3.38	3.07±0.23
Dorsal fin base length (L)	16	3.80 (46.58)	3.34-3.92	3.59±0.15	13	3.50 (40.06)	3.50-3.77	3.62±0.06
Interdorsal length (M)	16	4.69 (37.77)	4.45-5.16	4.87±0.21	13	6.01 (23.33)	4.89-6.01	5.46±0.32
Thoracic length (N)	16	4.26 (41.53)	4.02-4.37	4.20±0.10	13	4.59 (30.53)	3.88-4.59	4.18±0.18
Pectoral fin spine length (O)	16	3.63 (48.82)	3.22-3.63	3.43±0.12	13	3.06 (45.87)	2.93-4.31	3.21±0.35
Abdominal length (P)	16	4.97 (35.61)	4.69-5.68	5.11±0.27	13	4.65 (30.14)	4.54-5.27	4.85±0.22
Pelvic fin spine length (Q)	16	4.43 (40.02)	4.15-4.44	4.29±0.09	13	3.82 (36.72)	3.54-3.89	3.75±0.11
Caudal peduncle length (R)	16	3.07 (57.70)	2.79-3.20	3.02±0.10	13	3.19 (44.00)	3.11-3.45	3.24±0.09
Caudal peduncle depth (S)	16	11.46 (15.45)	9.88-11.46	10.34±0.40	13	8.79 (15.95)	8.71-9.63	9.07±0.29
Upper caudal ray length (U)	12	3.29 (53.78)	2.96-3.87	3.36±0.29	7		2.42-3.44	2.97±0.36
Lower caudal ray length (V)	13	3.49 (50.73)	2.68-3.64	3.22±0.28	11		2.10-3.13	2.59±0.27
Ratio of head length								
Cleithral width (F)	16	1.11 (46.28)	1.03-1.21	1.09±0.04	13	1.04 (45.25)	1.00-1.11	1.06±0.03
Head depth (G)	16	1.38 (37.21)	1.31-1.52	1.41±0.05	13	1.46 (32.30)	1.39-1.62	1.49±0.07
Snout length (H)	16	1.54 (33.50)	1.53-1.72	1.58±0.05	13	1.45 (32.54)	1.45-1.58	1.54±0.04
Orbital diameter (I)	16	5.88 (8.75)	5.63-6.59	6.02±0.27	13	5.48 (8.60)	4.68-5.69	5.19±0.32
Interorbital width (J)	16	2.06 (24.96)	1.92-2.20	2.01±0.06	13	2.07 (22.76)	1.92-2.15	2.04±0.07
Ratio of predorsal length								
Dorsal fin spine length (K)	11	1.36 (48.83)	1.24-1.88	1.43±0.20	11	1.28 (46.03)	1.12-1.38	1.28±0.08
Ratios of caudal peduncle length								
Caudal peduncle depth (S)	16	3.73 (15.45)	3.26-3.73	3.43±0.14	13	2.76 (15.95)	2.66-2.98	2.80±0.11
Adipose fin spine length (T)	16	5.05 (11.42)	4.91-5.84	5.40±0.22	13	3.62 (12.17)	3.62-5.95	4.39±0.55
Ratio of interorbital width								
Right mandibular ramus (RM)	16	3.48 (7.18)	3.37-3.89	3.56±0.15	13	3.29 (6.91)	3.20-4.38	3.86±0.39

TABLE 3. Morphometrie data of *Hypostomus simios* sp. n. and *Hypostomus hemicochliodon*

	Hypostomus simios				*Hypostomus hemicochliodon*			
	n	holotype	range	mean ± SD	n	holotype	range	mean ± SD
Standard length in mm (A)	16	157.9	108.8-157.9	124.70±20.60	10	169.0	148.3-229.6	191.28±27.99
Ratio of standard length								
Predorsal distance (D)	5	2.59 (60.94)	2.52-2.64	2.57±0.05	10	2.66 (63.45)	2.23-2.78	2.53±0.10
Head length (E)	5	3.11 (50.82)	2.94-3.11	3.02±0.07	10	3.14 (53.74)	2.65-3.43	3.03±0.14
Dorsal fin spine length (K)	2	broken	2.88-3.02	2.95±0.10	8	3.15 (53.58)	3.08-3.90	3.53±0.23
Dorsal fin base length (L)	5	3.39 (46.57)	3.34-3.60	3.45±0.11	10	3.28 (51.50)	3.29-4.11	3.56±0.17
Interdorsal length (M)	5	5.20 (30.40)	4.96-5.38	5.18±0.19	10	5.47 (30.92)	4.49-6.03	5.16±0.35
Thoraeie length (N)	5	4.34 (36.41)	3.98-4.94	4.37±0.36	10	4.33 (39.07)	3.67-4.65	4.16±0.22
Peetoral fin spine length (O)	5	3.09 (51.19)	3.09-3.34	3.23±0.11	10	2.99 (56.46)	2.87-3.47	3.20±0.14
Abdominal length (P)	5	4.68 (33.74)	4.68-5.24	5.03±0.22	10	4.95 (34.12)	4.57-5.54	5.05±0.25
Pelvic fin spine length (Q)	5	3.96 (39.93)	3.82-4.29	4.03±0.21	10	4.15 (40.76)	3.69-4.44	4.07±0.17
Caudal pedunele length (R)	5	3.13 (50.40)	2.98-3.13	3.06±0.07	10	3.12 (54.20)	2.92-3.55	3.24±0.15
Caudal pedunele depth (S)	5	9.80 (16.11)	9.80-10.17	9.97±0.14	10	9.66 (17.50)	7.69-9.45	8.86±0.38
Upper eaudal ray length (U)	4	3.49 (45.24)	2.63-3.49	3.09±0.37	7	3.86 (43.77)	3.00-4.64	3.69±0.45
Lower eaudal ray length (V)	4	2.91 (54.25)	2.83-3.09	2.93±0.11	8		2.73-4.31	3.22±0.45
Ratio of head length								
Cleithral width (F)	5	1.08 (47.17)	1.08-1.19	1.17±0.05	10	1.08 (49.74)	1.00-1.13	1.07±0.03
Head depth (G)	5	1.47 (34.55)	1.47-1.53	1.50±0.03	10	1.46 (36.74)	1.32-1.47	1.42±0.04
Snout length (H)	5	1.59 (31.96)	1.59-1.64	1.62±0.02	10	1.54 (34.91)	1.48-1.61	1.55±0.03
Orbital diameter (I)	5	5.40 (9.41)	4.70-5.40	5.03±0.27	10	5.78 (9.29)	5.04-6.20	5.58±0.31
Interorbital width (J)	5	2.13 (23.83)	2.04-2.17	2.10±0.06	10	2.01 (26.76)	1.69-2.04	1.84±0.09
Ratio of predorsal length								
Dorsal fin spine length (K)	2	broken	1.09-1.20	1.15±0.08	8	1.18 (53.58)	1.22-1.58	1.39±0.09
Ratios of eaudal pedunele length								
Caudal pedunele depth (S)	5	3.13 (16.11)	3.13-3.39	3.26±0.12	10	3.10 (17.50)	2.29-2.98	2.74±0.16
Adipose fin spine length (T)	5	5.33 (9.46)	5.33-6.23	5.87±0.40	10	5.23 (10.37)	3.80-5.62	4.76±0.42
Ratio of interorbital width								
Right mandibular ramus (RM)	5	3.34 (7.14)	3.34-3.82	3.65±0.19	10	3.71 (7.21)	3.54-6.21	4.47±0.60

TABLE 4. Meristic data of the five new species and *Hypostomus hemicochliodon*

	Hypostomus waiampi					*Hypostomus ericae*					*Hypostomus paucipunctatus*				
	holotype	n	range	mean	SD	holotype	n	range	mean	SD	holotype	n	range	mange	SD
Lateral plates of median series	29	9	27-29	28.22	0.67	29	26	27-29	27.58	0.7	29	16	28-30	28.41	0.61
Dorsal fin base plates	8	9	8	8	0	8	28	7-9	7.96	0.49	8	15	8-9	8.2	0.42
Dorsal to adipose fin plates	8	4	8	8	0	7	28	6-8	7.04	0.51	8	15	7-9	7.5	0.53
Adipose to caudal fin plates	8	10	7-8	7.9	0.32	9	26	7-9	7.89	0.57	8	15	7-8	7.4	0.46
Anal to caudal fin plates	12	3	12-13	12.3	0.5	13	28	12-13	12.79	0.42	14	14	13-14	13.65	0.47
Teeth on left premaxilla	8	10	6-8	6.7	1.16	7	26	6-8	7.38	0.64	7	15	6-9	7.53	0.83
Teeth on right premaxilla	6	8	5-6	5.63	0.52	7	26	6-8	7.23	0.76	8	15	6-9	7.47	0.83
Teeth on left dentary	7	10	7-9	7	1.25	7	25	7-9	7.48	0.71	8	15	7-10	8.2	0.86
Teeth on right dentary	7	10	6-9	6.8	1.32	7	26	7-9	7.5	0.65	8	15	7-10	8.2	1.01
Vertebrae	33	1	33	33	0	31	1	31	31	0	33	1	33	33	0

	Hypostomus soniae					*Hypostomus simios*					*Hypostomus hemicochliodon*				
	holotype	n	range	mean	SD	holotype	n	range	mean	SD		n	range	mange	SD
Lateral plates of median series	27	12	25-27	26.38	0.65	28	5	28	28	0		10	27-29	28	0.41
Dorsal fin base plates	7	12	7-8	7.62	0.51	8	5	8	8	0		10	8-9	8.1	0.32
Dorsal to adipose fin plates	7	12	6-7	6.46	0.52	8	5	7-8	7.4	0.55		10	7-8	7.7	0.48
Adipose to caudal fin plates	8	12	7-8	7.69	0.48	8	5	8	8	0		10	7-8	7.9	0.32
Anal to caudal fin plates	12	12	12-13	12.17	0.39	13	5	13-14	13.8	0.45		10	13-14	13.8	0.42
Teeth on left premaxilla	14	11	11-14	12.73	1.1	14	5	14	14	0		10	14-17	15.3	1.06
Teeth on right premaxilla	13	12	11-16	12.58	1.51	14	5	13-15	14.2	0.84		10	15-18	15.7	0.95
Teeth on left dentary	15	10	12-17	14.2	1.69	12	5	12-13	12.2	0.45		10	13-16	13.4	2.07
Teeth on right dentary	15	12	12-17	13.75	1.6	14	5	13-14	13.4	0.55		10	13-15	13.7	0.82
Vertebrae	31	1	31	31	0	33	1	33	33	0		1	31	31	0

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APPENDIX (other specimens examined):

BRAZIL. *Hypostomus cochliodon* Kner, 1853: Syntypes: NMW 46277 and 44101, 2 ex., 149.0 - 170.7 mm SL. Mato Grosso: Rio Cujaba; *Hypostomus pyrineusi* (Miranda-Ribeiro, 1920): Holotype: MNRJ 863, 200.0 mm SL. Amazonas: Rio Jamari. COLOMBIA: *Hypostomus oculeus* (Fowler, 1943): NRM 27052, 104.3 mm SL. Caqueta: Quebrada Montanita. ECUADOR: *Hypostomus sculpodon* Armbruster, 2003: MEPN-RBS-88-E-4, 3 ex., 74.1 – 95.1 mm SL. Napo: rio Napo Basin: Estero Cantadoro, Rio Tiputini, 20 min. upstream of mouth of Rio Tivacuno. PARAGUAY: Concepción: *Hypostomus* aff. *soniae*: MHNG 2527.038, 1 ex., 162.0 mm SL. Riacho La Paz, 6 km north of Estancia Primavera; MHNG 2644.068, 5 ex., 115.7 – 121.6 mm SL. Estancia Primavera, riacho La Paz; MHNG 2644.069, 2 ex., 142.5 – 144.6 mm SL. Ford of Tagatiya-guazu; MHNG 2644.070, 1 ex., 142.0 mm SL. Estancia Primavera, Arroyo Alegre; MHNG 2644.071, 1 ex., 147.4 mm SL. Rio Alegre, 5 km east from Estancia Primavera; MHNG 2644.072, 1 ex., 130.0 mm SL. Arroyo Alegre, southeast of Estancia Primavera.